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(54) Locking means

(57) A pair of components, such as panels 22, 56 for a sectional building are secured together by means of members 4, 6, one of which is retractable and has a spring 52 resiliently biasing it against retraction, the members 4, 6 being such that when attached to their respective components with neither retracted the nut and bolt engage while the components 22, 56 are still distanced from each other. The bolt is rotated by worm drive 10, 14 and said rotation draws the components together into the desired position. The nut 48 may be square to prevent it rotating, and the bolt 6 has a tapered end for ease of location within the nut 48.

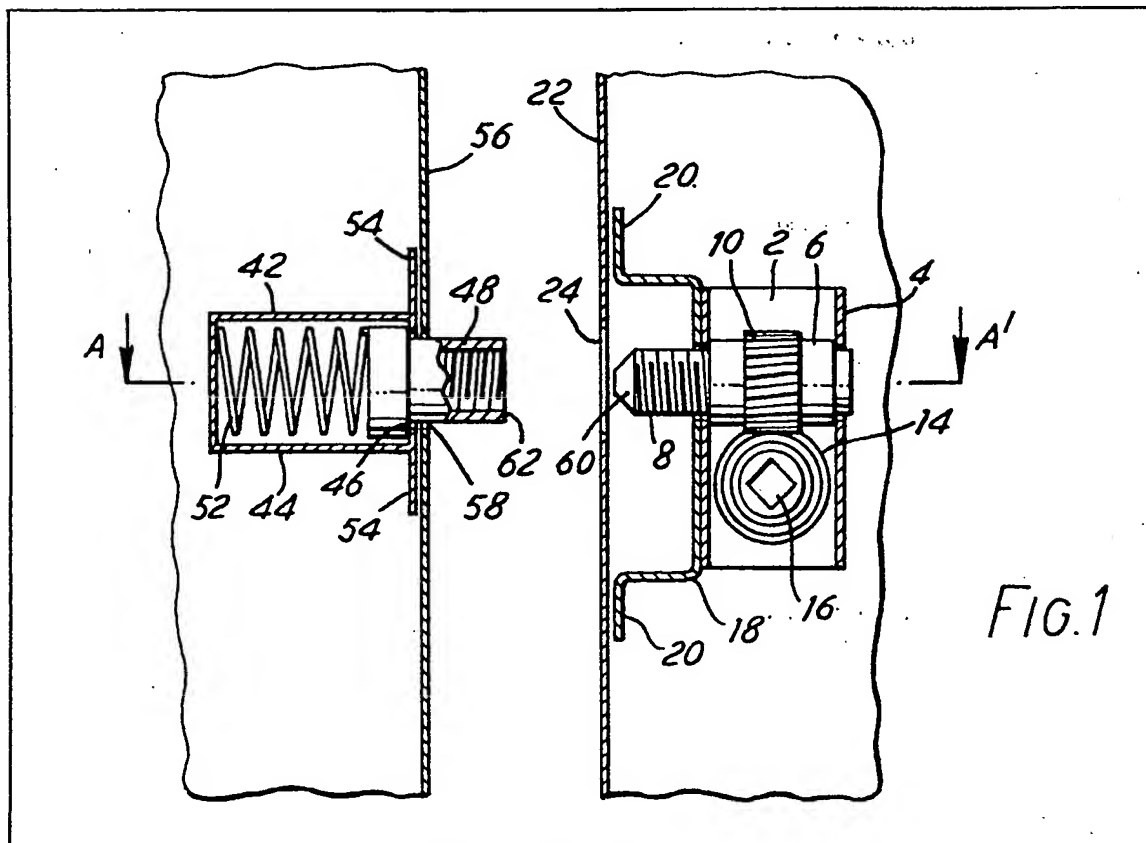


FIG. 1

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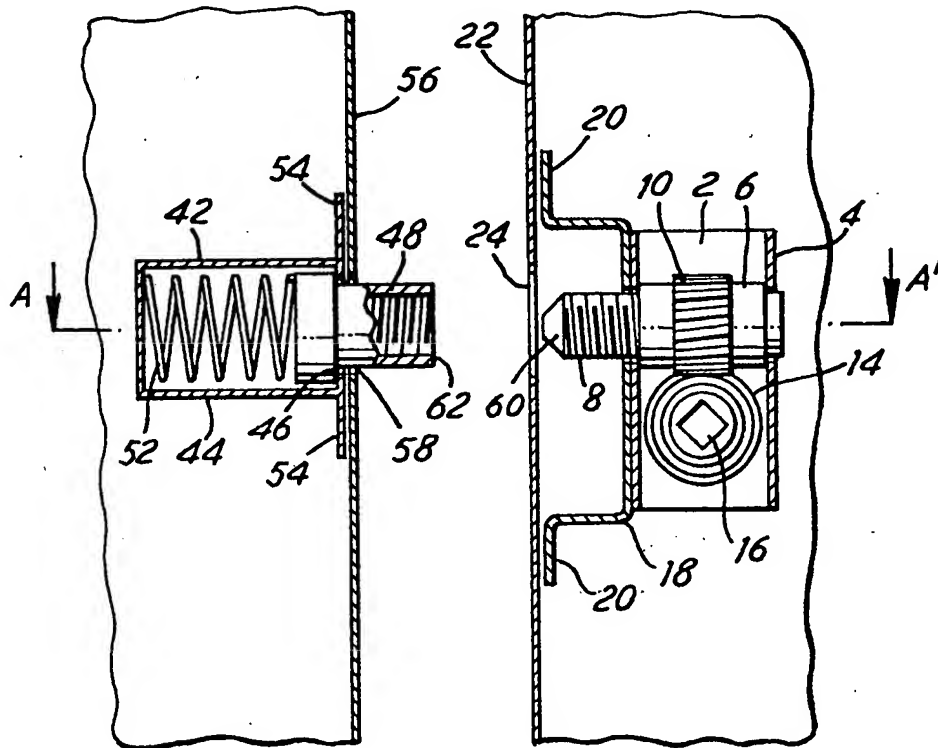


FIG. 1

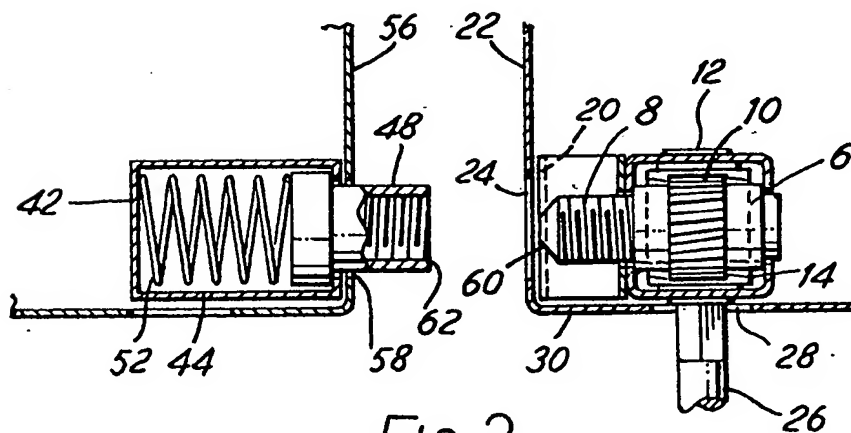


FIG. 2

SPECIFICATION Locking means

This invention relates to means for locking together the abutting faces of a pair of components that are to be joined together temporarily, and is particularly suitable for the locking together of parts of sectional buildings, especially hollow metal panel parts.

- In broad terms, the present invention provides means for locking together a pair of components, especially panels for a sectional building, and including (a) a male member adapted for attachment to one of the components and including an externally screw-threaded bolt, (b) a female member adapted for attachment to the other of said components and including an internally screw-threaded nut adapted to be engaged by said bolt on relative axial rotation of said nut and bolt whereby to lock the components together, and (c) means for effecting said relative axial rotation so as to lock the components together, at least one of said nut and bolt being axially retractable and having associated therewith means resiliently biasing it against retraction and the male and female members being such that when attached to their respective components the nut and bolt engage while at least one of the components is still distanced from the location relative to the other in which it is to be locked to the other and said relative rotation draws the components together into the desired locked position.

- Preferably only one of said nut and bolt is axially rotatable, and the other, which is arranged for at most only limited axial rotation, is the one which is axially retractable. Conveniently, it is the bolt which is axially rotatable and the nut which is axially retractable. It is also preferred that the relative axial rotation is effected by means of a member which is rotatable about a second axis which extends in a direction generally transverse to that of said relative axial rotation.

- In a preferred embodiment, the locking means comprise a male member including a first support member such as a frame or housing and, mounted for rotation about its axis on said support member, a rod which is externally threaded adjacent a free end thereof, and gear means for rotating said rod by rotation of a spindle about an axis which is generally transverse to the rod axis, said male member being adapted to be attached to one of the components with the rod axis generally normal to the plane of that face of the component which is to be abutted against a face of the other component and said free end of the rod facing towards, flush with or protruding through said plane, and a female member comprising a second support member and, mounted thereon, a nut into which the externally threaded end of the rod can be screwed, said female member also including means limiting or preventing axial rotation of the nut and said female member being adapted to be attached to the other of the components with the nut axis aligned with the axis of the rod of the

- male member and a mouth of the nut opening towards, flush with or protruding through the plane of that face of said other component against which said face of said first mentioned component is to be abutted and such that as the two components are drawn towards each other in the direction of the common axis of the rod and the nut, the free end of the rod engages the mouth of the nut before the said faces of the two components meet, at least one of said nut and externally threaded rod being retractable in the axial direction and having means such as a spring resiliently biasing it against retraction.

- In use, the male and female members are so mounted on their respective components that as the faces of the components are caused to approach each other, the nose of the rod engages the mouth of the nut before the faces abut. Thereafter, moving the faces closer together will cause one or both of said rod and nut to retract against the resilient bias and bias the nut and rod against each other. Using any suitable means such as a key or a power drill engaging said gear means, the rod is then rotated in a direction screwing it into the nut whereby to lock the two components together.

- The gear means for rotating the bolt may, for example, comprise a pair of skew gears but is preferably a worm and wheel arrangement since this more readily permits the application of greater torque and is cheaper.

For simplicity of construction and assembly, it is preferred that it is the nut which is axially retractable.

- The invention will now be described in greater detail with reference to one embodiment thereof and with the aid of the accompanying drawings in which:

- Figure 1 is a cross-sectional side elevation of male and female members of the locking means mounted in position on a pair of components such as panels of a sectional building, and Figure 2 is a cross-sectional plan view at the plane AA' of Figure 1.

- Referring to the drawing, the male member 2 comprises a housing 4, which is suitably journaled to receive an axle 6. The forward end of the axle protrudes through the front face of the housing and, for a distance extending rearwardly from the nose, is provided with an external thread to form an externally threaded rod 8. Fixedly mounted on the axle to rotate therewith is a gear wheel or pinion 10. Mounted in the housing and to rotate about an axis normal to the axis of axle 6 is a second axle 12 on which is mounted a worm wheel 14 in engagement with the gear wheel 10. The axle 12 is provided with a suitably profiled hollow section 16, as shown, adapted to receive the spindle of a key or other means for rotating the axle and worm wheel. To the front face of the housing is attached a mounting bracket 18 which is cranked so that when the flanges 20 thereof are attached behind the face 22 of a component such as a hollow metal panel, e.g. by means of set screws or nuts and bolts or by spot welding, the

nose of the rod 8 projects slightly forward of the plane of the front surface of the face and behind a suitably located and dimensioned aperture 24 in the face. The axis of the axle 12 carrying the worm wheel 14 extends in a plane parallel to the face of the component so that it can be engaged and rotated by a spindle 26 (Figure 2) inserted through a suitably positioned aperture 28 in the side wall 30 of the component, as shown in Figure 2.

- 10 The female member 42 comprises a housing 44 having at one end an opening 46. Mounted in, and to slide in an axial direction relative to the housing is a screw-threaded nut 48 comprising an internally screw-threaded length of hollow cylindrical rod. The nut is provided with a shoulder 50 which has a diameter greater than that of the aperture in the housing, whereby to retain the nut within the housing and, in its forward position, the nose of the nut extends forwardly out of the aperture. Means are provided for preventing the nut from rotating relative to the housing e.g. by forming the housing and the shoulder to have a square cross section. Within the housing, extending axially between the rear wall of the housing and the back of the nut, is a compressed coiled spring 52. The housing is provided at its front end with a pair of flanges 54 by means of which the member may be attached behind the face 56 of a component such as a hollow panel of a section building with the head of the nut projecting through a suitably positioned and dimensioned aperture 58 in the face.

- The male and female members are located and mounted on their respective components so that the nut and rod are generally coaxial when the components are correctly aligned for joining together. To assist engagement, however, the nose of the threaded rod 8 may be tapered as shown at 60 and the mouth of the nut 48 may be similarly tapered, as shown at 62.

- In operation, the two components which are to be locked together are brought towards each other in correct alignment for joining and with the axes of the threaded rod 8 and nut 48 of the male and female members in general alignment, until the nose of the rod engages the nut. The components are then forced closer together so as to cause the nut to be retracted and compress the spring 52 thereby biasing the nut and rod against each other. Rotating the axle 12 to rotate the worm wheel and screw the rod into the nut will then lock the two components together. The axle 12 may be rotated by any suitable means and where the component is, for example, a hollow panel, e.g., of a sectional building, the side wall of the panel is provided with an aperture through which a spindle, e.g. attached to a power drill, may be passed to engage and rotate the axle.

CLAIMS

- 60 1. Means for locking together a pair of components, especially panels for a sectional building, and including (a) a male member adapted for attachment to one of the components and

- including an externally screw-threaded bolt, (b) a female member adapted for attachment to the other of said components and including an internally screw-threaded nut adapted to be engaged by said bolt on relative axial rotation of said nut and bolt whereby to lock the components together, and (c) means for effecting said relative axial rotation so as to lock the components together, at least one of said nut and bolt being axially retractable and having associated therewith means resiliently biasing it against retraction and the male and female members being such that when attached to their respective components the nut and bolt engage while at least one of the components is still distanced from the location relative to the other in which it is to be locked to the other and said relative rotation draws the components together into the desired locked position.

2. Locking means as claimed in claim 1 in which one of said nut and bolt is axially rotatable and the other is arranged for at most only limited axial rotation and is axially retractable.

3. Locking means as claimed in claim 2 in which the bolt is axially rotatable and the nut is axially retractable.

4. Locking means as claimed in any one of claims 1 to 3 in which the means for effecting relative axial rotation is such that said rotation is effectable by means of a member which is rotatable about a second axis which extends in a direction generally transverse to that of said relative axial rotation.

5. Means for locking together the abutting faces of a pair of components such as panels of a sectional building, said means comprising a male member including a first support member such as a frame or housing and, mounted for rotation about its axis on said support member, a rod which is externally threaded adjacent a free end thereof, and gear means for rotating said rod by rotation of a spindle about an axis which is generally transverse to the rod axis, said male member being adapted to be attached to one of the components with the rod axis generally normal to the plane of that face of the component which is to be abutted against a face of the other component and said free end of the rod facing towards, flush with or protruding through said plane, and

- a female member comprising a second support member and, mounted thereon, a nut into which the externally threaded end of the rod can be screwed, said female member also including means limiting or preventing axial rotation of the nut and said female member being adapted to be attached to the other of the components with the nut axis aligned with the axis of the rod of the male member and a mouth of the nut opening towards, flush with or protruding through the plane of that face of said other component against which said face of said first-mentioned component is to be abutted and such that as the two components are drawn towards each other in the direction of the common axis of the rod and the

nut, the free end of the rod engages the mouth of the nut before the said faces of the two components meet,

- 5 at least one of said nut and externally threaded rod being retractable in the axial direction and having means such as a spring resiliently biasing it against retraction.

- 10 6. Locking means as claimed in claim 5 in which the gear means for rotating the bolt comprises a worm and wheel arrangement.

7. Locking means as claimed in claim 5 or claim 6 in which the nut is axially retractable.

- 15 8. Locking means as claimed in claim 5, claim 6 or claim 7 in which the nose of the threaded end of the rod is tapered and the mouth of the nut is

similarly tapered to assist engagement of the rod and nut.

- 20 9. Locking means as claimed in claim 1, substantially as described herein with particular reference to the accompanying drawings.

10. A pair of components adapted for locking together, one of which includes a male member and the other of which includes a female member, respectively, of a locking means as claimed in any one of claims 1 to 9, the members being located on their respective components for engagement with each other to lock the components together.

- 25 11. The arrangement claimed in claim 10 wherein the components are hollow panels for a sectional building.

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